



## SEQUENCE LISTING

<110> Angelis, Bryan  
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<151> 2003-03-31  
<150> 10/142,143  
<151> 2002-05-08  
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 85 90 95

Ile Val Cys Tyr Leu Thr Ile Gln Ser Arg Tyr Phe Lys Asn Gly Glu  
 100 105 110

Arg Val Lys Leu Phe Glu His Ile Ser Asn Ala Leu Arg Tyr Ser Arg  
 115 120 125

Ser Asp Phe Leu Ile Asn Leu Ile Phe Glu Arg Tyr Ile Glu Tyr Ile  
 130 135 140

Asn His Leu Lys Leu Ser Pro Lys Gln Lys Asp Phe Tyr Phe Cys Thr  
 145 150 155 160

Lys Phe Ser Lys Phe His Asp Tyr Thr Lys Asn Gly Tyr Lys Tyr Leu  
 165 170 175

Ala Phe Asp Asn Gln Ala Asp Ala Gly Tyr Gly Leu Thr Leu Leu Leu  
 180 185 190

Asn Ala Asn Asp Asp Met Gln Asp Ser Tyr Asn Leu Leu Pro Glu Gln  
 195 200 205

Glu Leu Phe Ile Cys Asn Ala Val Ile Asp Asn Met Asn Ile Tyr Arg  
 210 215 220

Ser Gln Phe Asn Lys Cys Leu Arg Lys Tyr Asp Leu Ser Glu Ile Thr  
 225 230 235 240

Asp Ile Tyr Pro Asn Lys Ile Ile Leu Gln Gly Ile Lys Phe Asp Lys  
 245 250 255

Lys Lys Asn Val Tyr Gly Lys Asp Leu Val Ser Ile Ile Met Ser Val  
 260 265 270

Phe Asn Ser Glu Asp Thr Ile Ala Tyr Ser Leu His Ser Leu Leu Asn  
275 280 285

Gln Thr Tyr Glu Asn Ile Glu Ile Leu Val Cys Asp Asp Cys Ser Ser  
290 295 300

Asp Lys Ser Leu Glu Ile Ile Lys Ser Ile Ala Tyr Ser Ser Ser Arg  
305 310 315 320

Val Lys Val Tyr Ser Ser Arg Lys Asn Gln Gly Pro Tyr Asn Ile Arg  
325 330 335

Asn Glu Leu Ile Lys Lys Ala His Gly Asn Phe Ile Thr Phe Gln Asp  
340 345 350

Ala Asp Asp Leu Ser His Pro Glu Arg Ile Gln Arg Gln Val Glu Val  
355 360 365

Leu Arg Asn Asn Lys Ala Val Ile Cys Met Ala Asn Trp Ile Arg Val  
370 375 380

Ala Ser Asn Gly Lys Ile Gln Phe Phe Tyr Asp Asp Lys Ala Thr Arg  
385 390 395 400

Met Ser Val Val Ser Ser Met Ile Lys Lys Asp Ile Phe Ala Thr Val  
405 410 415

Gly Gly Tyr Arg Gln Ser Leu Ile Gly Ala Asp Thr Glu Phe Tyr Glu  
420 425 430

Thr Val Ile Met Arg Tyr Gly Arg Glu Ser Ile Val Arg Leu Leu Gln  
435 440 445

Pro Leu Ile Leu Gly Leu Trp Gly Asp Ser Gly Leu Thr Arg Asn Lys  
450 455 460

Gly Thr Glu Ala Leu Pro Asp Gly Tyr Ile Ser Gln Ser Arg Arg Glu  
465 470 475 480

Tyr Ser Asp Ile Ala Ala Arg Gln Arg Val Leu Gly Lys Ser Ile Val  
485 490 495

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 Phe Tyr Gln Thr Pro Glu Val Asn Asp Val Val Asp Glu Arg Glu Phe  
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 Ser Ala Val Gln Val Ser Thr Met Trp Asp Ser Met Val Leu Glu Leu  
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 Met Met Asn Asn Leu Asn Asn Lys Leu Trp Gly Trp Ala Asp Pro Ser  
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 Ile Ile Phe Phe Leu Asp Phe Trp Lys Asn Ile Asp Lys Ser Ile Lys  
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 Phe Ile Met Ile Tyr Asp His Pro Lys Tyr Asn Leu Met Arg Ser Val  
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 Asn Asn Ala Pro Leu Ser Leu Asn Ile Asn Asn Ser Val Asp Asn Trp  
 130 135 140  
 Ile Ala Tyr Asn Lys Arg Leu Leu Asp Phe Phe Leu Glu Asn Lys Glu  
 145 150 155 160  
 Arg Cys Val Leu Ile Asn Phe Glu Ala Phe Gln Ser Asn Lys Lys Asn  
 165 170 175  
 Ile Ile Lys Pro Leu Ser Asn Ile Ile Lys Ile Asp Asn Leu Met Ser  
 180 185 190  
 Ala His Tyr Lys Asn Ser Ile Leu Phe Asp Val Val Glu Asn Asn Asp  
 195 200 205  
 Tyr Thr Lys Ser Asn Glu Ile Ala Leu Leu Glu Lys Tyr Thr Thr Leu  
 210 215 220  
 Phe Ser Leu Ser Ala Asn Glu Thr Glu Ile Thr Phe Asn Asp Thr Lys  
 225 230 235 240  
 Val Ser Glu Tyr Leu Val Ser Glu Leu Ile Lys Glu Arg Thr Glu Val  
 245 250 255  
 Leu Lys Leu Tyr Asn Glu Leu Gln Ala Tyr Ala Asn Leu Pro Tyr Ile  
 260 265 270  
 Glu Thr Ser Lys Asp Asn Val Ser Ala Glu Ala Ala Leu Trp Glu Val  
 275 280 285  
 Val Glu Glu Arg Asn Ser Ile Phe Asn Ile Val Ser His Leu Val Gln  
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 Glu Ser Lys Lys Lys Asp Ala Asp Ile Glu Leu Thr Lys Ser Ile Phe  
 305 310 315 320  
 Lys Lys Arg Gln Phe Leu Leu Leu Asn Arg Ile Asn Glu Leu Lys Lys  
 325 330 335  
 Glu Lys Glu Glu Val Ile Lys Leu Ser Lys Ile Asn His Asn Asp Val  
 340 345 350

Val Arg Gln Glu Lys Tyr Pro Asp Asp Ile Glu Lys Lys Ile Asn Asp  
 355 360 365  
 Ile Gln Lys Tyr Glu Glu Glu Ile Ser Glu Lys Glu Ser Lys Leu Thr  
 370 375 380  
 Gln Ala Ile Ser Glu Lys Glu Gln Ile Leu Lys Gln Leu His Lys Tyr  
 385 390 395 400  
 Glu Glu Glu Ile Ser Glu Lys Glu Ser Lys Leu Thr Gln Ala Ile Ser  
 405 410 415  
 Glu Lys Glu Gln Ile Leu Lys Gln Leu His Ile Val Gln Glu Gln Leu  
 420 425 430  
 Glu His Tyr Phe Ile Glu Asn Gln Glu Ile Lys Lys Lys Leu Pro Pro  
 435 440 445  
 Val Leu Tyr Gly Ala Ala Glu Gln Ile Lys Gln Glu Leu Gly Tyr Arg  
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 Leu Gly Tyr Ile Ile Val Ser Tyr Ser Lys Ser Leu Lys Gly Ile Ile  
 465 470 475 480  
 Thr Met Pro Phe Ala Leu Ile Arg Glu Cys Val Phe Glu Lys Lys Arg  
 485 490 495  
 Lys Lys Ser Tyr Gly Val Asp Val Pro Leu Tyr Leu Tyr Ala Asp Ala  
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 Asp Lys Ala Glu Arg Val Lys Lys His Leu Ser Tyr Gln Leu Gly Gln  
 515 520 525  
 Ala Ile Ile Ser Ser Ala Asn Ser Ile Phe Gly Phe Ile Thr Leu Pro  
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 <213> Pasteurella multocida

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 35 40 45  
 Ile Ala Ser Arg Ile Ala Asn Ser Thr Ser Lys Val Lys Thr Phe Arg  
 50 55 60  
 Leu Asn Ser Asn Leu Gly Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu

65                      70                      75                      80  
 Lys Ser Lys Gly Asp Ile Ile Phe Phe Gln Asp Ser Asp Asp Val Cys  
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 His His Glu Arg Ile Glu Arg Cys Val Asn Ala Leu Leu Ser Asn Lys  
                                  100                                   105                                   110  
 Asp Asn Ile Ala Val Arg Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr  
                                  115                                   120                                   125  
 Gln Asn Ile Ile Lys Val Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile  
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 Thr Leu Gly Val Tyr Arg  
 145                                   150

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 <213> Pasteurella multocida

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                                  20                                   25                                   30  
 Leu His Gly Val Ile Phe Pro Ser Arg Val Asn Lys Tyr Phe Ser Ser  
                                  35                                   40                                   45  
 Asp Arg Ile Val Tyr Asn Phe Gln Lys Thr Phe Arg Lys Asp Thr Ala  
                                  50                                   55                                   60  
 Val Asn Ile Leu Gly Thr Gly Thr Val Ala Phe Arg Val Ser Ile Phe  
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 Tyr Phe Ser

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acaaaagaaa gactaggagc cccccctcta gtcagtatta taatgacttc tcataataca	180
gaaaaattca ttgaagcctc aattaattca ctattattgc aaacatacaa taacttagaa	240
gttatcggtg tagatgatta tagcacagat aaaacatttc agatcgcatc cagaatagca	300
aactctacaa gtaaagtaaa aacattccga ttaaactcaa atctagggac atactttgcg	360
aaaaatacag gaatttttaa gtctaaagga gatattattt tctttcagga tagcgatgat	420
gtatgtcacc atgaaagaat cgaaagatgt gttaatgcat tattatcgaa taaagataat	480

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 aatgataata aatacaaatt aggattaata actttaggcg tttatagaaa agtatttaat 600  
 gaaattgggt tttttaactg cacaaccaa gcacgcgatg atgaatttta tcatagaata 660  
 attaaatact atggtaaaaa taggataaat aacttatttc taccactgta ttataacaca 720  
 atgcgtgaag attcattatt ttctgatatg gttgagtggg tagatgaaaa taatataaag 780  
 caaaaaacct ctgatgctag acaaaattat ctccatgaat tccaaaaaat acacaatgaa 840  
 aggaaattaa atgaattaaa agagattttt agctttccta gaattcatga cgccttacct 900  
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35 40 45

Pro Leu Val Ser Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile  
50 55 60

Glu Ala Ser Ile Asn Ser Leu Leu Leu Gln Thr Tyr Asn Asn Leu Glu  
65 70 75 80

Val Ile Val Val Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala  
85 90 95

Ser Arg Ile Ala Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn  
100 105 110

Ser Asn Leu Gly Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser  
115 120 125



Lys Gly Asp Ile Ile Phe Phe Gln Asp Ser Asp Asp Val Cys His His  
 130 135 140  
 Glu Arg Ile Glu Arg Cys Val Asn Ala Leu Leu Ser Asn Lys Asp Asn  
 145 150 155 160  
 Ile Ala Val Arg Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn  
 165 170 175  
 Ile Ile Lys Val Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu  
 180 185 190  
 Gly Val Tyr Arg Lys Val Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr  
 195 200 205  
 Thr Lys Ala Ser Asp Asp Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr  
 210 215 220  
 Gly Lys Asn Arg Ile Asn Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr  
 225 230 235 240  
 Met Arg Glu Asp Ser Leu Phe Ser Asp Met Val Glu Trp Val Asp Glu  
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 Glu Phe Gln Lys Ile His Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu  
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 Ile Phe Ser Phe Pro Arg Ile His Asp Ala Leu Pro Ile Ser Lys Glu  
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 Ser Ile Pro Ser Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu  
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 Lys Asn Gln Cys Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu  
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 Val Pro Asp Phe Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn  
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 Cys Gln Asn Lys Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu  
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 Lys Ile Asn Lys Tyr Asn Asp Lys Ala Ala Ile Gly Leu His Gly Val  
 420 425 430  
 Ile Phe Pro Ser Arg Val Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val  
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Tyr Asn Phe Gln Lys Pro Leu Glu Asn Asp Thr Ala Val Asn Ile Leu  
450 455 460

Gly Thr Gly Thr Val Ala Phe Arg Val Ser Ile Phe Asn Lys Phe Ser  
465 470 475 480

Leu Ser Asp Phe Glu His Pro Gly Met Val Asp Ile Tyr Phe Ser Ile  
485 490 495

Leu Cys Lys Lys Asn Asn Ile Leu Gln Val Cys Ile Ser Arg Pro Ser  
500 505 510

Asn Trp Leu Thr Glu Asp Asn Lys Asn Thr Glu Thr Leu Phe His Glu  
515 520 525

Phe Gln Asn Arg Asp Glu Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn  
530 535 540

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Tyr Ser Glu Leu Ile Pro Cys Leu Ser Phe Tyr Asn Glu  
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tcaaacttag ggacataact tgcgaaaaat acaggaattt taaagtctaa aggagatatt 300  
atcttctttc aggatagcga tgatgtatgt caccatgaaa gaatcgaaag atgtgttaat 360  
gcattattat cgaataaaga taatatagct gttagatgtg catattctag aataaatcta 420  
gaaacacaaa atataataaa agttaatgat aataaataca aattaggatt aataacttta 480  
ggcgtttata gaaaagtatt taatgaaatt ggttttttta actgcacaac caaagcatcg 540  
gatgatgaat ttatcatag aataattaaa tactatggta aaaataggat aaataactta 600  
tttctaccac tgtattataa cacaatgcgt gaagattcat ttttttctga tatggttgag 660  
tggttagatg aaaataatat aaagcaaaaa acctctgatg ctagacaaaa ttatctccat 720  
gaattccaaa aaatacacaa tgaaaggaaa ttaaatgaat taaaagagat ttttagcttt 780  
cctagaattc atgacgcctt acctatatca aaagaaatga gtaagctcag caaccctaaa 840  
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 Val Ile Val Val Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala  
 50 55 60  
 Ser Arg Ile Ala Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn  
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 Ser Asn Leu Gly Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser  
 85 90 95  
 Lys Gly Asp Ile Ile Phe Phe Gln Asp Ser Asp Asp Val Cys His His  
 100 105 110  
 Glu Arg Ile Glu Arg Cys Val Asn Ala Leu Leu Ser Asn Lys Asp Asn  
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 Ile Ala Val Arg Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn  
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 Ile Ile Lys Val Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu  
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 Gly Val Tyr Arg Lys Val Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr  
 165 170 175  
 Thr Lys Ala Ser Asp Asp Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr  
 180 185 190  
 Gly Lys Asn Arg Ile Asn Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr  
 195 200 205  
 Met Arg Glu Asp Ser Leu Phe Ser Asp Met Val Glu Trp Val Asp Glu  
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Asn Asn Ile Lys Gln Lys Thr Ser Asp Ala Arg Gln Asn Tyr Leu His  
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 Glu Phe Gln Lys Ile His Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu  
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 Ile Phe Ser Phe Pro Arg Ile His Asp Ala Leu Pro Ile Ser Lys Glu  
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 Met Ser Lys Leu Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys  
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 Ser Ile Pro Ser Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu  
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 Lys Asn Gln Cys Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu  
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 Val Pro Asp Phe Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn  
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 Cys Gln Asn Lys Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu  
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 Leu Glu Lys Leu Ile Lys Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys  
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 Asp Asp Asp Ile Arg Tyr Pro Ala Asp Tyr Ile Asn Thr Met Ile Lys  
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 Gly Thr Gly Thr Val Ala Phe Arg Val Ser Ile Phe Asn Lys Phe Ser  
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 Phe Gln Asn Arg Asp Glu Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn  
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Asp Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Ile Ala Xaa Xaa Xaa Xaa  
 20 25 30

Xaa Xaa Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Xaa Gly Xaa Tyr Xaa  
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe  
 50 55 60

Gln Asp Xaa Asp Asp Xaa Xaa His Xaa Glu Arg Ile Xaa Arg  
 65 70 75

<210> 23  
 <211> 82  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Motif II

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 <223> K or R

<220>  
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 <222> (3)..(3)  
 <223> any amino acid

<220>  
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 <223> any amino acid

<220>  
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 <223> one to five amino acids

<220>  
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<223> R or I

<220>

<221> MISC\_FEATURE

<222> (27)..(27)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (30)..(32)

<223> any amino acid

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<222> (34)..(72)

<223> any amino acid

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<222> (76)..(76)

<223> any amino acid

<400> 23

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1 5 10 15

Xaa Xaa Xaa Asp Asp Ile Xaa Tyr Pro Xaa Asp Tyr Xaa Xaa Xaa  
20 25 30

Met Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
50 55 60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Asn Xaa Leu Gly Thr Gly  
65 70 75 80

Thr Val

<210> 24

<211> 1854

<212> DNA

<213> Pasteurella multocida

<400> 24

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gatatatgta aaaaaaatat aacacaatca aaaagtaata aaatagaaga agataatatt 180  
tctggagaaa acaaaatttc agtatcaata aaagatctat ataacgaaat aagcaatagt 240  
gaattaggga ttacaaaaga aagactagga gccccccctc tagtcagtat tataatgact 300  
tctcataata cagaaaaatt cattgaagcc tcaattaatt cactattatt gcaaacatac 360  
aataacttag aagttatcgt tgtagatgat tatagcacag ataaaacatt tcagatcgca 420  
tccagaatag caaactctac aagtaaagta aaaacattcc gattaaactc aaatctaggg 480  
acatactttg cgaaaaatac aggaatttta aagtctaaag gagatattat tttctttcag 540  
aatagcaatg atgtatgtca ccatgaaaga atcgaaagat gtgttaatgc attattatcg 600  
aataaagata atatagctgt tagatgtgca tattctagaa taaatctaga aacacaaaat 660



ataataaaag ttaatgataa taaatacaaa ttaggattaa taactttagg cgtttataga 720  
 aaagtattta atgaaattgg tttttttaac tgcacaacca aagcatcggg tgatgaattt 780  
 tatcatagaa taattaaata ctatggtaaa aataggataa ataacttatt tctaccactg 840  
 tattataaca caatgcgtga agattcatta ttttctgata tggttgagtg ggtagatgaa 900  
 aataatataa agcaaaaaac ctctgatgct agacaaaatt atctccatga attccaaaaa 960  
 atacacaatg aaaggaaatt aaatgaatta aaagagattt ttagctttcc tagaattcat 1020  
 gacgccttac ctatatcaaa agaagttagt aagctcagca accctaaaat tcctgtttat 1080  
 ataaatatat gctcaatacc ttcaagaata aaacaacttc aatacactat tggagtacta 1140  
 aaaaaccaat gcgatcattt tcatatttat ctgatggat atccagaagt acctgatttt 1200  
 ataaaaaac tagggaataa agcgaccgtt attaattgtc aaaacaaaaa tgagtctatt 1260  
 agagataatg gaaagtttat tctattagaa aaacttataa aggaaaataa agatggatat 1320  
 tatataactt gtgatgatga tatccggtat cctgctgact acataaacac tatgataaaa 1380  
 aaaattaata aatacaatga taaagcagca attggattac atgggtgttat attcccaagt 1440  
 agagtcaaca agtatttttc atcagacaga attgtctata attttcaaaa acctttagaa 1500  
 aatgatactg ctgtaaatat attaggaact ggaactgttg ccttttagagt atctattttt 1560  
 aataaatttt ctctatctga ttttgagcat cctggcatgg tagatatcta tttttctata 1620  
 ctatgtaaga aaaacaatat actccaagtt tgtatatcac gaccatcgaa ttggctaaca 1680  
 gaagataaca aaacactga gaccttattt catgaattcc aaaatagaga tgaaatacaa 1740  
 agtaaactca ttatttcaaa caacccttg gataactcaa gtatatatcc attattaaat 1800  
 aataatgcta attattctga acttattccg tgtttatctt tttataacga gtaa 1854

<210> 25  
 <211> 617  
 <212> PRT  
 <213> Pasteurella multocida

<400> 25

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 Lys Asp Ala Leu Thr Leu Tyr Glu Asn Ile Ala Lys Ile Tyr Gly Ser  
 20 25 30  
 Glu Ser Leu Val Lys Tyr Asn Ile Asp Ile Cys Lys Lys Asn Ile Thr  
 35 40 45  
 Gln Ser Lys Ser Asn Lys Ile Glu Glu Asp Asn Ile Ser Gly Glu Asn  
 50 55 60  
 Lys Phe Ser Val Ser Ile Lys Asp Leu Tyr Asn Glu Ile Ser Asn Ser  
 65 70 75 80  
 Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser  
 85 90 95  
 Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile  
 100 105 110  
 Asn Ser Leu Leu Leu Gln Thr Tyr Asn Asn Leu Glu Val Ile Val Val  
 115 120 125

Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala  
 130 135 140  
 Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly  
 145 150 155 160  
 Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile  
 165 170 175  
 Ile Phe Phe Gln Asn Ser Asn Asp Val Cys His His Glu Arg Ile Glu  
 180 185 190  
 Arg Cys Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg  
 195 200 205  
 Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val  
 210 215 220  
 Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu Gly Val Tyr Arg  
 225 230 235 240  
 Lys Val Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys Ala Ser  
 245 250 255  
 Asp Asp Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg  
 260 265 270  
 Ile Asn Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr Met Arg Glu Asp  
 275 280 285  
 Ser Leu Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys  
 290 295 300  
 Gln Lys Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys  
 305 310 315 320  
 Ile His Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu Ile Phe Ser Phe  
 325 330 335  
 Pro Arg Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu  
 340 345 350  
 Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser  
 355 360 365  
 Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys  
 370 375 380  
 Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe  
 385 390 395 400  
 Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys  
 405 410 415  
 Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu  
 420 425 430  
 Ile Lys Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Asp Ile  
 435 440 445

Arg Tyr Pro Ala Asp Tyr Ile Asn Thr Met Ile Lys Lys Ile Asn Lys  
 450 455 460  
 Tyr Asn Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser  
 465 470 475 480  
 Arg Val Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val Tyr Asn Phe Gln  
 485 490 495  
 Lys Pro Leu Glu Asn Asp Thr Ala Val Asn Ile Leu Gly Thr Gly Thr  
 500 505 510  
 Val Ala Phe Arg Val Ser Ile Phe Asn Lys Phe Ser Leu Ser Asp Phe  
 515 520 525  
 Glu His Pro Gly Met Val Asp Ile Tyr Phe Ser Ile Leu Cys Lys Lys  
 530 535 540  
 Asn Asn Ile Leu Gln Val Cys Ile Ser Arg Pro Ser Asn Trp Leu Thr  
 545 550 555 560  
 Glu Asp Asn Lys Asn Thr Glu Thr Leu Phe His Glu Phe Gln Asn Arg  
 565 570 575  
 Asp Glu Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn Pro Trp Gly Tyr  
 580 585 590  
 Ser Ser Ile Tyr Pro Leu Leu Asn Asn Asn Ala Asn Tyr Ser Glu Leu  
 595 600 605  
 Ile Pro Cys Leu Ser Phe Tyr Asn Glu  
 610 615

<210> 26  
 <211> 1854  
 <212> DNA  
 <213> Pasteurella multocida

<400> 26  
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 gatatatgta aaaaaatat aacacaatca aaaagtaata aaatagaaga agataatatt 180  
 tctggagaaa acaaattttc agtatcaata aaagatctat ataacgaaat aagcaatagt 240  
 gaattaggga ttacaaaaga aagactagga gccccccctc tagtcagtat tataatgact 300  
 tctcataata cagaaaaatt cattgaagcc tcaattaatt cactattatt gcaaacatac 360  
 aataacttag aagttatcgt ttagatgat tatagcacag ataaaacatt tcagatcgca 420  
 tccagaatag caaactctac aagtaaagta aaacattcc gattaaactc aaatctaggg 480  
 acatactttg cgaaaaatac aggaatttta aagtctaaag gagatattat tttctttcag 540  
 gatagcgatg atgtatgtca ccatgaaaga atcgaaagat gtgttaatgc attattatcg 600  
 aataaagata atatagctgt tagatgtgca tattctagaa taaatctaga aacacaaaat 660  
 ataataaaag ttaatgataa taaatacaaa ttaggattaa taacttttagg cgtttataga 720  
 aaagtattta atgaaattgg tttttttaac tgcacaacca aagcatcgga tgatgaattt 780  
 tatcatagaa taattaaata ctatggtaaa aataggataa ataacttatt tctaccactg 840  
 tattataaca caatgcgtga agattcatta ttttctgata tggttgagtg ggtagatgaa 900

aataatataa agcaaaaaac ctctgatgct agacaaaatt atctccatga attccaaaaa 960  
atacacaatg aaaggaaatt aaatgaatta aaagagattt ttagctttcc tagaattcat 1020  
gacgccttac ctatatcaaa agaaatgagt aagctcagca accctaaaat tcctgtttat 1080  
ataaatatat gctcaatacc ttcaagaata aaacaacttc aatacactat tggagtacta 1140  
aaaaaccaat gcgatcattt tcatatttat cttgatggat atccagaagt acctgatttt 1200  
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aaaattaata aatacaatga taaagcagca attggattac atgggtgttat attcccaagt 1440  
agagtcaaca agtatttttc atcagacaga attgtctata attttcaaaa accttttagaa 1500  
aatgatactg ctgtaaatat attaggaact ggaactgttg cttttagagt atctattttt 1560  
aataaatttt ctctatctga ttttgagcat cctggcatgg tagatatcta tttttctata 1620  
ctatgtaaga aaaacaatat actccaagtt tgtatatcac gaccatcgaa ttggctaaca 1680  
gaagataaca aaaacactga gacctattt catgaattcc aaaatagaga tgaaatacaa 1740  
agtaaactca ttatttcaaa caacccttgg ggatactcaa gtatatatcc attattaaat 1800  
aataatgcta attattctga acttattccg tgtttatctt tttataacga gtaa 1854

<210> 27  
<211> 617  
<212> PRT  
<213> Pasteurella multocida

<400> 27

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Lys Asp Ala Leu Thr Leu Tyr Glu Asn Ile Ala Lys Ile Tyr Gly Ser  
20 25 30  
Glu Ser Leu Val Lys Tyr Asn Ile Asp Ile Cys Lys Lys Asn Ile Thr  
35 40 45  
Gln Ser Lys Ser Asn Lys Ile Glu Glu Asp Asn Ile Ser Gly Glu Asn  
50 55 60  
Lys Phe Ser Val Ser Ile Lys Asp Leu Tyr Asn Glu Ile Ser Asn Ser  
65 70 75 80  
Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser  
85 90 95  
Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile  
100 105 110  
Asn Ser Leu Leu Leu Gln Thr Tyr Asn Asn Leu Glu Val Ile Val Val  
115 120 125  
Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala  
130 135 140  
Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly  
145 150 155 160

Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile  
 165 170 175  
 Ile Phe Phe Gln Asp Ser Asp Asp Val Cys His His Glu Arg Ile Glu  
 180 185 190  
 Arg Cys Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg  
 195 200 205  
 Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val  
 210 215 220  
 Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu Gly Val Tyr Arg  
 225 230 235 240  
 Lys Val Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys Ala Ser  
 245 250 255  
 Asp Asp Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg  
 260 265 270  
 Ile Asn Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr Met Arg Glu Asp  
 275 280 285  
 Ser Leu Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys  
 290 295 300  
 Gln Lys Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys  
 305 310 315 320  
 Ile His Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu Ile Phe Ser Phe  
 325 330 335  
 Pro Arg Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu  
 340 345 350  
 Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser  
 355 360 365  
 Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys  
 370 375 380  
 Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe  
 385 390 395 400  
 Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys  
 405 410 415  
 Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu  
 420 425 430  
 Ile Lys Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asn Asp Asn Ile  
 435 440 445  
 Arg Tyr Pro Ala Asp Tyr Ile Asn Thr Met Ile Lys Lys Ile Asn Lys  
 450 455 460  
 Tyr Asn Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser  
 465 470 475 480

Arg Val Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val Tyr Asn Phe Gln  
 485 490 495  
 Lys Pro Leu Glu Asn Asp Thr Ala Val Asn Ile Leu Gly Thr Gly Thr  
 500 505 510  
 Val Ala Phe Arg Val Ser Ile Phe Asn Lys Phe Ser Leu Ser Asp Phe  
 515 520 525  
 Glu His Pro Gly Met Val Asp Ile Tyr Phe Ser Ile Leu Cys Lys Lys  
 530 535 540  
 Asn Asn Ile Leu Gln Val Cys Ile Ser Arg Pro Ser Asn Trp Leu Thr  
 545 550 555 560  
 Glu Asp Asn Lys Asn Thr Glu Thr Leu Phe His Glu Phe Gln Asn Arg  
 565 570 575  
 Asp Glu Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn Pro Trp Gly Tyr  
 580 585 590  
 Ser Ser Ile Tyr Pro Leu Leu Asn Asn Asn Ala Asn Tyr Ser Glu Leu  
 595 600 605  
 Ile Pro Cys Leu Ser Phe Tyr Asn Glu  
 610 615

<210> 28  
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 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> sense primer

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<210> 29  
 <211> 42  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> antisense primer

<400> 29  
 catggtgaca tacatcattg ctattctgaa agaaaataat at 42

<210> 30  
 <211> 37  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> sense primer

<400> 30  
 gatattatat aacttgtaat gataatatcc ggtatcc 37

<210> 31  
 <211> 37  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> antisense primer

<400> 31  
ggataccgga tattatcatt acaagttata taatatc 37

<210> 32  
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<212> PRT  
<213> artificial sequence

<220>  
<223> synthetic peptide

<400> 32  
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Glu Arg Ile Glu Arg  
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<210> 33  
<211> 1956  
<212> DNA  
<213> Pasteurella multocida

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aaagacatca ttttcaaca aactttattg gcaaaacagg acagtaaaca tccgctatcc 180  
gcatcccttg aaaacgaaaa taaactttta ttaaaacaac tccaattggt tctgcaagaa 240  
tttgaaaaaa tatataccta taatcaagca ttagaagcaa agctagaaaa agataagcaa 300  
acaacatcaa taacagatgt atataatgaa gtcgctaaaa gtgatttagg gttagtcaaa 360  
gaaactaaca gcgcaaatcc attagtcagt attatcatga catctcaca tacagcgcaa 420  
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acaagcaaag tcagagtatt tagattaaat tcaaacctag gaacttactt tgcgaaaaat 600  
acaggcatat taaaatctaa aggtgacatt attttctttc aagatagtga tgatgtatgt 660  
catcatgaaa gaatagaaag atgtgtaaat atattattag ctaataaaga aactattgct 720  
gttcgttggt catactcaag actagacca gaaacacaac atatcattaa agtcaataat 780  
atggattata gattagggtt tataaccttg ggtatgcaca gaaaagtatt tcaagaaatt 840  
ggtttcttca attgtacgac taaaggctca gatgatgagt tttttcatag aattgcgaaa 900  
tattatggaa aagaaaaaat aaaaaattta ctcttgccgt tatactacaa cacaatgaga 960  
gaaaactctt tatttactga tatggttgaa tggatagaca atcataacat aatacagaaa 1020  
atgtctgata ccagacaaca ttatgcaacc ctgtttcaag cgatgcataa cgaaactgcc 1080  
tcacatgatt tcaaaaatct ttttcaattc cctcgatttt acgatgcctt accagtacca 1140  
caagaaatga gtaagttgtc caatcctaag attcctgttt atatcaatat ttgttctatt 1200  
ccctcaagaa tagcgcaatt acgacgtatt atcggcatac taaaaaatca atgtgatcat 1260  
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attttactgg aagagttgat tgaaaaaat caagatggat attatataac ctgtgatgat 1440  
gacattatct atccaagcga ttacatcaat acgatgatca agaagctgaa tgaatacgat 1500  
gataaagcgg ttattggttt acacggcatt ctctttccaa gtagaatgac caaatatgtt 1560

tcggcggata gactggtata tagcttctat aaacctctgg aaaaagacaa agcgggtcaat 1620  
gtattaggta caggaactgt tagctttaga gtcagtctct ttaatcaatt ttctctttct 1680  
gactttaccc attcaggcat ggctgatatc tatttctctc tcttggttaa gaaaaataat 1740  
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gaaacactct atcatcaata tcgagacaat gatgagcaac aaactcagct gatcatggaa 1860  
aacggtccat ggggatattc aagtatttat ccattagtca aaaatcatcc taaatttact 1920  
gaccttatcc cctgtttacc tttttatttt ttataa 1956

<210> 34  
<211> 651  
<212> PRT  
<213> Pasteurella multocida

<400> 34

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Pro Gln His Glu Lys Glu Asn Glu Leu Asn Thr Phe Gln Asn Lys Ile  
20 25 30

Asp Ser Leu Lys Thr Thr Leu Asn Lys Asp Ile Ile Ser Gln Gln Thr  
35 40 45

Leu Leu Ala Lys Gln Asp Ser Lys His Pro Leu Ser Ala Ser Leu Glu  
50 55 60

Asn Glu Asn Lys Leu Leu Lys Gln Leu Gln Leu Val Leu Gln Glu  
65 70 75 80

Phe Glu Lys Ile Tyr Thr Tyr Asn Gln Ala Leu Glu Ala Lys Leu Glu  
85 90 95

Lys Asp Lys Gln Thr Thr Ser Ile Thr Asp Leu Tyr Asn Glu Val Ala  
100 105 110

Lys Ser Asp Leu Gly Leu Val Lys Glu Thr Asn Ser Ala Asn Pro Leu  
115 120 125

Val Ser Ile Ile Met Thr Ser His Asn Thr Ala Gln Phe Ile Glu Ala  
130 135 140

Ser Ile Asn Ser Leu Leu Leu Gln Thr Tyr Lys Asn Ile Glu Ile Ile  
145 150 155 160

Ile Val Asp Asp Asp Ser Ser Asp Asn Thr Phe Glu Ile Ala Ser Arg  
165 170 175

Ile Ala Asn Thr Thr Ser Lys Val Arg Val Phe Arg Leu Asn Ser Asn  
180 185 190

Leu Gly Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly  
195 200 205

Asp Ile Ile Phe Phe Gln Asp Ser Asp Asp Val Cys His His Glu Arg  
210 215 220

Ile Glu Arg Cys Val Asn Ile Leu Leu Ala Asn Lys Glu Thr Ile Ala



225                      230                      235                      240  
 Val Arg Cys Ala Tyr Ser Arg Leu Ala Pro Glu Thr Gln His Ile Ile  
                                  245                                   250                                   255  
 Lys Val Asn Asn Met Asp Tyr Arg Leu Gly Phe Ile Thr Leu Gly Met  
                                  260                                   265                                   270  
 His Arg Lys Val Phe Gln Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys  
                                  275                                   280                                   285  
 Gly Ser Asp Asp Glu Phe Phe His Arg Ile Ala Lys Tyr Tyr Gly Lys  
                                  290                                   295                                   300  
 Glu Lys Ile Lys Asn Leu Leu Leu Pro Leu Tyr Tyr Asn Thr Met Arg  
                                  305                                   310                                   315                                   320  
 Glu Asn Ser Leu Phe Thr Asp Met Val Glu Trp Ile Asp Asn His Asn  
                                  325                                   330                                   335  
 Ile Ile Gln Lys Met Ser Asp Thr Arg Gln His Tyr Ala Thr Leu Phe  
                                  340                                   345                                   350  
 Gln Ala Met His Asn Glu Thr Ala Ser His Asp Phe Lys Asn Leu Phe  
                                  355                                   360                                   365  
 Gln Phe Pro Arg Ile Tyr Asp Ala Leu Pro Val Pro Gln Glu Met Ser  
                                  370                                   375                                   380  
 Lys Leu Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile  
                                  385                                   390                                   395                                   400  
 Pro Ser Arg Ile Ala Gln Leu Arg Arg Ile Ile Gly Ile Leu Lys Asn  
                                  405                                   410                                   415  
 Gln Cys Asp His Phe His Ile Tyr Leu Asp Gly Tyr Val Glu Ile Pro  
                                  420                                   425                                   430  
 Asp Phe Ile Lys Asn Leu Gly Asn Lys Ala Thr Val Val His Cys Lys  
                                  435                                   440                                   445  
 Asp Lys Asp Asn Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu  
                                  450                                   455                                   460  
 Glu Leu Ile Glu Lys Asn Gln Asp Gly Tyr Tyr Ile Thr Cys Asp Asp  
                                  465                                   470                                   475                                   480  
 Asp Ile Ile Tyr Pro Ser Asp Tyr Ile Asn Thr Met Ile Lys Lys Leu  
                                  485                                   490                                   495  
 Asn Glu Tyr Asp Asp Lys Ala Val Ile Gly Leu His Gly Ile Leu Phe  
                                  500                                   505                                   510  
 Pro Ser Arg Met Thr Lys Tyr Phe Ser Ala Asp Arg Leu Val Tyr Ser  
                                  515                                   520                                   525  
 Phe Tyr Lys Pro Leu Glu Lys Asp Lys Ala Val Asn Val Leu Gly Thr  
                                  530                                   535                                   540  
 Gly Thr Val Ser Phe Arg Val Ser Leu Phe Asn Gln Phe Ser Leu Ser

545		550		555		560
Asp Phe Thr His	Ser 565	Gly Met Ala Asp	Ile 570	Tyr Phe Ser	Leu 575	Leu Cys
Lys Lys Asn	Asn 580	Ile Leu Gln	Ile 585	Cys Ser Arg	Pro 590	Ala Asn Trp
Leu Thr	Glu 595	Asp Asn Arg	Asp 600	Ser Glu Thr	Leu Tyr	His 605
Gln Tyr Arg						
Asp Asn Asp	Glu 610	Gln Gln Thr	Gln 615	Leu Ile Met	Glu 620	Asn Gly Pro Trp
Gly Tyr Ser	Ser 625	Ile Tyr Pro	Leu Val	Lys Asn 635	His Pro	Lys Phe Thr 640
Asp Leu Ile	Pro 645	Cys Leu Pro	Phe Tyr	Phe 650	Leu	